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ABSTRACT

Noting that children's average daily intake of fruits and vegetables is well below recommended minimums, this report responds to a request from the Appropriations Committee Directives, Fiscal Year 2002 to compare fruits/vegetable availability in schools with and without salad bars. The comparison was made using data from the School Nutrition Dietary Assessment Study collected during the 1998-99 school year. Information was collected from School Food Authorities by telephone and from cafeteria managers in sample schools using a mail survey. Section 1 of the report describes salad bar availability and analyzes trends during the 1990s. Section 2 describes what fruits/vegetables are contained in salad bars. Section 3 compares the variety of fruits/vegetables in schools with and without salad bars. Section 4 describes characteristics of schools with and without salad bars. Section 5 notes data limitations, and Section 6 presents discussion and conclusions. The key findings are as follows: (1) salad bars are available at least once weekly in 21 percent of public schools, are most common in high schools, least common in elementary schools, and more common in more affluent schools than in less affluent schools; (2) a wide range of vegetables/fruits are available in salad bars; (3) schools with salad bars offer a wider variety of fruits/vegetables than other schools; and (4) salad bars are more common in rural and suburban schools than in urban schools. The report notes that determining the qualities of fruits/vegetables served or consumed would require additional data and cautions that differences associated with salad bars were not necessarily caused by schools adding salad bars. It is further noted that schools do not, on average, meet nutrition standards for fat, saturated fat, and sodium. The report's three appendices provide supplementary data tables, an exploratory comparison of food and nutrient characteristics of meals in schools with and without salad bars, and a discussion of the study's methodology. (KB)

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The Office of Analysis, Nutrition and Evaluation

Special Nutrition Programs | Report No. CN-02-SB

SCHOOL LUNCH SALAD BARS

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School Lunch Salad Bars

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School Lunch Salad Bars

EXECUTIVE SUMMARY

This reports fulfills a request to the Department of Agriculture (USDA) from the Appropriations Committee Directives, Fiscal Year 2002. The following language is contained in House Report 107-116:

> *School Lunch Salad Bars. –The Committee is concerned about school lunch nutrition, and in particular about increasing the consumption of fruits and vegetables among children. The Committee directs the Department to analyze data collected in the School Nutrition Dietary Assessment Study, Part II to compare the amount of fruit and vegetables available to children in schools with salad/fruit bars versus those without salad/fruit bars. The Committee requests a report on this analysis by April 1, 2002.*

As requested, this report compares the availability of fruits and vegetables in schools with and without salad bars using data from the School Nutrition Dietary Assessment Study, Part II (SNDA-II), which were collected during the School Year (SY) 1998-99. SNDA-II data enables us to examine the choice and variety of foods offered at salad bars, but not the quantity in a typical serving or the amount consumed.

Our key findings are as follows:

Salad bar availability varies by grade level and free and reduced price eligibility status:

- Twenty-one percent of public schools offer a salad bar at least once per week.
- Salad bars are most common in high schools and least common in elementary schools. Forty-one percent of high schools, 26 percent of middle schools, and 14 percent of elementary schools offer a salad bar at least once per week.
- On a typical school day, 20 percent of public school children have access to a salad bar, that is, they are enrolled in a school where a salad bar is served.
- Free and reduced price approved children are less likely to be enrolled in a school which offers a salad bar than paid status children because salad bars were more commonly found in the more affluent public NSLP schools.

A wide range of vegetables and fruits are available in salad bars:

- Nearly all salad bars include at least one vegetable, with the most prevalent being lettuce, tomatoes, and other raw vegetables.

- Over one-half of salad bars include at least one type of fruit, with the most prevalent types being fresh fruit and canned fruit.

Schools with salad bars offer a wider variety of vegetables and fruits than other schools:

- At all grade levels, schools with salad bars are more likely to offer green salad, raw vegetables, fresh fruit, canned fruit, and dried fruit than schools without salad bars.

- Elementary schools with salad bars are more likely to offer fruit or vegetable juice. Middle schools with salad bars are more likely to offer legumes, and high schools with salad bars are more likely to offer legumes, cooked vegetables, or french fries (either baked or fried) than schools without salad bars.

- Middle schools with salad bars are more likely to serve baked french fries and less likely to serve fried french fries than middle schools without salad bars. Baked french fries have, on average, a lower percent of calories from fat than fried french fries.

The presence of a salad bar is related to school characteristics and NSLP participation:

- Schools offering a salad bar at least once per week have a lower percentage of students who are free and reduced price approved than schools without salad bars.

- In middle schools and high schools, National School Lunch Program (NSLP) participation rates for all students are higher for schools with a salad bar at least once per week than for schools without salad bars. Urban schools are less likely to have salad bars than rural or suburban schools.

- High schools with 500-999 students are more likely to have salad bars than larger or smaller schools.

Determining the quantities of fruits and vegetables served to or consumed by students would require additional data collection such as a third, expanded version of the FNS-sponsored School Nutrition Dietary Assessment series.

One overarching caveat for this report is that the differences associated with salad bars noted above have not necessarily been caused by schools adding salad bars. It is possible that schools with these pre-existing characteristics were more likely to add salad bars. For example, schools with pre-existing higher NSLP participation may have chosen to add salad bars so one cannot conclude from this report that adding salad bars caused the higher NSLP participation.

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School Lunch Salad Bars

Introduction

This reports fulfills a request to the Department of Agriculture (USDA) from the Appropriations Committee Directives, Fiscal Year 2002. The following language is contained in House Report 107-116:

> *School Lunch Salad Bars. –The Committee is concerned about school lunch nutrition, and in particular about increasing the consumption of fruits and vegetables among children. The Committee directs the Department to analyze data collected in the School Nutrition Dietary Assessment Study, Part II to compare the amount of fruit and vegetables available to children in schools with salad/fruit bars versus those without salad/fruit bars. The Committee requests a report on this analysis by April 1, 2002.*

As requested, this report compares the availability of fruits and vegetables in schools with and without salad bars using data from the School Nutrition Dietary Assessment Study, Part II (SNDA-II) [Fox, et. al., 2001]. SNDA-II data enables us to examine the choice and variety of foods offered at salad bars, but not the quantity in a typical serving or the amount consumed.

Background

The *Dietary Guidelines for Americans* (U.S. Department of Agriculture and the Department of Health and Human Services, 2000) states: "Eating plenty of fruits and vegetables of different kinds, as part of [a] healthful eating pattern…may help protect you against many chronic diseases. Fruits and vegetables provide essential vitamins and minerals, fiber, and other substances that are import for good health. Most people, including children, eat fewer servings of fruits and vegetables than are recommended. To promote health, [one should] eat a variety of fruits and vegetables---at least 2 servings of fruits and 3 servings of vegetables---each day." An FNS-sponsored report *Changes in Children's Diets: 1989-1991 to 1994-1996* (Gleason and Suitor, 2001) found that only 14 percent of school-aged children met the target for fruits and only 17 percent met the target for vegetables. The children's mean daily intakes of both fruits (1.4 servings) and vegetables (2.6 servings) were below the Food Guide Pyramid's (U.S. Department of Agriculture, 1995) recommended minimum. Any form of fruits and/or vegetables---fresh, frozen, canned, cooked, dried---whether consumed alone or in a mixture count as Food Guide Pyramid servings. National School Lunch Program (NSLP) meals offer students the opportunity to select from a variety of fruits and vegetables.

The SNDA-II study produced national cross-sectional estimates of the nutrient composition of USDA meals served in elementary and secondary schools in SY 1998-99. The study focused exclusively on public schools, which account for roughly 90 percent of

all institutional NSLP participants. The study design included separate nationally representative probability samples of public School Food Authorities (SFAs), public elementary schools, middle schools, and high schools participating in the NSLP. Thus, study results are generalizable to *public* SFAs and *public* schools nationwide but not to the entire NSLP.[1]

The report is organized as follows. Section I describes the availability of salad bars, including an examination of whether the availability of salad bars grew during the 1990s. Section II describes what fruits and vegetables are contained in salad bars. Section III compares the variety of fruits and vegetables in schools with and without salad bars. Section IV describes the characteristics of schools with and without salad bars. The reports limitations are presented in Section V, and Section VI concludes.

Definitions: What is a Salad Bar?

For the purposes of this report, a salad bar is a self-serve station where students can select two or more fruits and/or vegetables.[2] Some salad bars can provide an entire NSLP reimbursable meal because they also provide meat or meat alternates, breads /grains and milk. The salad bars that comprise an entire reimbursable meal can be either entrée salad bars or theme bars. Theme salad bars include potato bars, soup and salad bars, salad and sandwich bars, and potato and salad bars.[3] Some salad bars do not offer all of the required meal components and therefore are typically combined with entrées and milk to make reimbursable lunches. Three categories of salad bars comprise part of reimbursable meals: side salad bars, self-serve fruit bars, and assorted self-serve raw vegetables.

Section I: How Common Are Salad Bars?

Section I. A. What's the Availability of Salad Bars in Schools?

About one-fifth (21 percent) of schools offer a salad bar at least once per week (Table 1).[4] High schools are most likely and elementary schools are least likely to offer salad bars. Forty-one percent of high schools offered some type of salad bar at least once per week, compared to 26 percent of middle schools and 14 percent of elementary schools. A smaller share of schools offered some type of salad bar on a daily basis: 31 percent of

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[1] In SY 1998/99 private schools only account for 7% of the NSLP schools and 3 percent of total enrollment.

[2] For one school, a potato bar was counted as a salad bar even though it had only one fruit or vegetable—the baked potato.

[3] Taco salad bars were not included in our definition of a salad bar although they could include vegetables such as lettuce and tomato.

[4] Our definition of a salad bar comes from data on what foods were served during one week between September 1998 and May 1999. Some schools may have had salad bars at other times during the school year but not during the reference week. Data from the SNDA-II survey of cafeteria managers suggest that many schools may have salad bars sometimes but did not have them during the reference week. Nine percent all schools (including 15 percent of high schools) had no salad bar during the reference week but had a cafeteria manger who reported that a salad bar was offered at least once per week.

high schools, 20 percent of middle schools, and 10 percent of elementary schools. [5] The most common types of salad bars are entrée salad bars and side salad bars, with theme salad bars, fruit bars, and self-serve assorted raw vegetables offered by a relatively small share of schools.

Table 1
Percentage of Public NSLP Schools Offering Different Types of Salad Bars

Percentage of Schools Offering	Elementary Schools	Middle Schools	High Schools	All Schools
Salad Bars That Are Entire Reimbursable Meal				
Daily Entrée Salad Bar	4**++	12**	22	9
Entrée Salad Bar at Least Once Per Week	6**++	18**	31	12
Daily Theme Salad Bar (Potato Bar or Combination Salad/Sandwich, Salad/Soup or Salad/Potato Bar)	<0.5	0	1	<0.5
Theme Salad Bar at Least Once Per Week	2	<0.5*	3	2
Salad Bars That are Part of Reimbursable Meal				
Daily Side Salad Bar	6	8	7	7
Side Salad Bar at Least Once Per Week	8	10	10	9
Daily Self-Serve Fruit Bar	2	1	1	2
Self-Serve Fruit Bar at Least Once Per Week	2	1	3	2
Daily Self-Serve Assorted Raw Vegetables	1	1	1	1
Self-Serve Assorted Raw Vegetables at Least Once Per Week	1	1	1	1
All Types of Salad Bars				
Daily Salad Bar of Any Type	10**++	20**	31	16
Any Type Of Salad Bar at Least Once Per Week	14**++	26**	41	21
Sample Size (Number of Schools):				
Unweighted	*385*	*329*	*328*	*1042*
Weighted	*45,979*	*12,342*	*12 856*	*71,177*

*Difference when compared to high schools is statistically significant at the .05 level
**Difference when compared to high schools is statistically significant at the .01 level
++ Difference when compared to middle schools is statistically significant at the .01 level
Source: Weighted tabulations of menu data from SNDA-II for one week between September 1998 and May 1999.

[5] All Schools column in all tables reflects all grade levels. Because elementary schools are more numerous than middle schools or high schools, elementary schools have the largest contribution to the all schools total. The analyses are not weighted by the student enrollment in each school.

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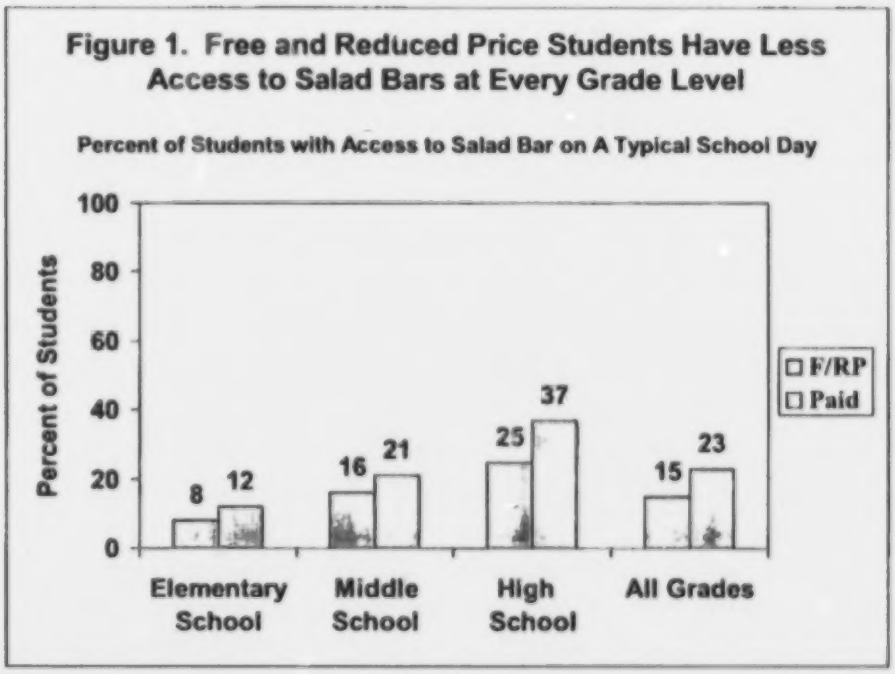
Section I.B.: How Available Were Salad Bars to Students in School Year (SY) 1998-99?

Next, we turn to the share of *students* who have access to salad bars, that is, students who are enrolled in schools where salad bars are offered. On a typical day, 20 percent of students are enrolled in a school where a salad bar is offered. Access varies by both grade level and free and reduced price status. High school students are the most likely to have access to a salad bar and elementary school students are the least likely. Thirty-four percent of high school students, 20 percent of middle school students, and 10 percent of elementary school students have access to a salad bar on a typical day. Free and reduced price students are less likely to have access to a salad bar than paid students. On a typical day, 15 percent of free and reduced price students are enrolled in a school where a salad bar is offered, compared with 23 percent of paid students (Figure 1 and Appendix Table A2).



Section I.C: Did Salad Bars Become More Prevalent During the 1990s?

Given the USDA's growing emphasis on the nutritional content of school lunches, a natural question is whether salad bars have become more prevalent over time. We examine this issue by comparing the two rounds of SNDA data. The original SNDA was collected during the 1991-92 school year and SNDA-II was collected during the 1998-99 school year. We examine the proportion of schools that offer either an entrée or side salad bar, since those were the only tabulations that are available for the SNDA data. Note that because the SNDA survey included private schools while the SNDA-II survey did not, the statistics calculated using the two surveys are not directly comparable. Comparing the

data can likely tell us about the direction of change in the availability of salad bars between the two survey years, but not the magnitude of change.

It appears that the availability of salad bars in elementary schools grew during the 1990s (Table 2). The percentage of elementary schools that offered an entrée or side salad bar at least once per week was 7 percent in SNDA and 12 percent in SNDA-II. The availability of daily salad bars also appears to have grown. Four percent of elementary schools offered a daily entrée or side salad bar in 1991-92 compared to 9 percent in 1998-99. Despite positive growth, salad bars remain considerably less prevalent in elementary schools than in secondary schools.

In middle schools and high schools, it appears that the availability of entrée and side salad bars did not increase substantially between the 1991-92 and 1998-99 school years. The data from middle schools show decline in both daily salad bars and salad bars served at least once per week. The data from high schools show a decrease in daily salad bars and perhaps a small increase (37 vs. 38 percent) in the percent of schools that offered salad bars at least once per week.

Table 2
Percentage of Public NSLP Schools Offering Entrée or Side Salad Bar: 1991-92 School Year v. 1998-99 School Year

Percentage of Schools Offering	Elementary Schools		Middle Schools		High Schools		All Schools	
	1991-92	1998-99	1991-92	1998-99	1991-92	1998-99	1991-92	1998-99
Daily entrée or side salad bar	4	9	22	19	33	29	12	15
Entrée or side salad bar at least once per week	7	12	29	25	37	38	15	19
Sample size (unweighted)	*278*	*385*	*92*	*329*	*145*	*328*	*515*	*1042*

Sources: 1991-92 School Year Weighted tabulations of menu data from SNDA (public and private schools combined) for one week between February 1992 and May 1992. Tabulations taken from p.77 of SNDA report. 1998-99 School Year: Weighted tabulations of menu data from SNDA-II (public schools only) for one week between September 1998 and May 1999.
Note: Published SNDA data are not available in enough detail to analyze whether the differences over time are statistically significant.

Section II: What Vegetables and Fruits are Offered in Salad Bars?
Section II.A: Number of Fruits and Vegetables.

The typical salad bar offers a wide variety of vegetables and fruits, 5.4 vegetables and 1.8 fruits (Table 3). Data on salad bar ingredients other than fruits and vegetables (such as meat and meat alternates, salad dressing, cheese, and croutons) are not available. This section does not describe the fruit and vegetable offerings that were not included as part of a salad bar, but were offered as part of the classic serving line. Section IV below presents a discussion of fruits and vegetables that includes non-salad bar menu items.

Salad bar offerings vary by grade level. Elementary school salad bars offer fewer vegetables on average (4.6) than either middle schools (5.7) or high schools (6.1). The lower number of total vegetables in elementary schools was due in part to the lower number of raw vegetables. Elementary schools offered an average of 2.9 raw vegetables compared to 3.4 in middle schools and 3.7 in high schools. The total number of fruits offered did not differ significantly among grade levels.

Table 3
Mean Number of Fruits and Vegetables Offered in a Salad Bar in Average Public NSLP School with Salad Bar

	Elementary Schools	Middle Schools	High Schools	All Schools
Mean Number of Vegetables	4.6**†	5.7	6.1	5.4
Mean Number of Raw Vegetables	2.9**†	3.4	3.7	3.3
Mean Number of Fruits	1.9	2	1.7	1.8
Sample Size (Number of Schools):				
Weighted	*54*	*86*	*117*	*257*
Unweighted	*6,423*	*3,222*	*5,267*	*14,914*

*Difference when compared to high schools is statistically significant at the .05 level
**Difference when compared to high schools is statistically significant at the .01 level
† Difference when compared to middle schools is statistically significant at the .05 level
Note: Only schools serving salad bars are included in the table.
Source: Weighted tabulations of menu data from SNDA-II for one week between September 1998 and May 1999.

Section II.B: Percent of Salad Bars Offering Different Types of Vegetables and Fruits

Nearly all salad bars (98 percent) include at least one vegetable. The most common salad bar offerings are lettuce, tomatoes, and other raw vegetables (Table 4). Ninety-two percent of salad bars include lettuce, 70 percent included tomatoes, and 90 percent include raw vegetables besides lettuce and tomatoes. The most common raw vegetables are broccoli, cauliflower, carrots, cucumber, and green peppers. Other common vegetable offerings are cooked vegetables and non-green salads (such as potato salad). (See Appendix Table A3 for more detail on individual vegetables.)

Over half of all salad bars (58 percent) offer at least one type of fruit (Table 5).

The most common fruit offerings were fresh and canned fruits. Forty-five percent of salad bars include fresh fruit and 35 percent included canned fruit. The most common individual fruit items are fresh apples, fresh bananas, fresh oranges, canned pineapple, and canned peaches. (See Appendix Table A4 for more detail on individual fruits.)

Elementary school salad bars are more likely to offer fresh fruit and less likely to offer canned fruit than high school salad bars.

Table 4
Average Percent of Salad Bars in NSLP Public Schools which Include Particular Types of Vegetables #

	Elementary School	Middle Schools	High Schools	All Schools
Any Vegetable	98	100	97	98
Lettuce	87	97	94	92
Tomato	62*	72	77	70
Any Raw Vegetable (excluding lettuce and tomato):	89	92	89	90
Any Cooked Vegetable	8*	14	20	13
Any Non-green Salad	8**	13	25	14
Any Legume	0**++	8	11	5
Vegetable Soup	0	<0.5	2	1
Baked Potato	10	4	4	6

#Note: Only schools serving salad bars at least once per week are included in this table. Only days in which salad bars were served are included in the analysis.
Source: Weighted tabulations of menu data from SNDA-II for one week between September 1998 and May 1999.
**Difference when compared to high schools is statistically significant at the .01 level.
* Difference when compared to high schools is statistically significant at the .05 level.
++ Difference when compared to middle schools is statistically significant at .01 level

Table 5
Average Percent of Salad Bars in NSLP Public Schools which Include Particular Types of Fruits #

	Elementary Schools	Middle Schools	High Schools	All Schools
Any Type of Fruit	65	49	57	58
Fresh Fruit	58**	39	34	45
Canned Fruit	25**	36	48	35
Dried Fruit	11	10	5	9
Frozen Fruit	7	4	3	5

Note: Only schools serving salad bars at least once per week are included in this table. Days in which salad bars were not served were excluded from the analysis.
Source: Weighted tabulations of menu data from SNDA-II **for one week between September 1998 and May 1999.

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Section III: Is There a Difference in The Variety of Fruits and Vegetables in Schools With Salad Bars and Schools Without Salad Bars?

Next, this report addresses the issue of whether schools with salad bars serve a wider variety of fruits and vegetables than schools without salad bars. The major finding from Table 6 is that schools with salad bars offer a significantly wider range of fruit and vegetable categories than other schools. For all grade levels, schools with salad bars are more likely to serve green salads, raw vegetables, fresh fruit, canned fruit, and dried fruit. For middle and high school levels, schools with salad bars are also more likely to serve legumes. Elementary schools with salad bars are more likely to serve fruit and/or vegetable juice. High schools with salad bars are more likely to serve cooked vegetables.

For green salads and raw vegetables, the findings are quite striking. For example, in the average elementary school that had a salad bar at least once a week, 87 percent of daily menus included green salad and 81 percent included raw vegetables. In contrast, in the average elementary school with no salad bars green salads were served on 35 percent of daily menus and raw vegetables on only 15 percent of daily menus. The differences are also large for middle schools and high schools.

The findings for french fries are interesting. In middle schools with salad bars, menus are more likely to include baked french fries and less likely to include fried french fries. Baked french fries have a lower percentage of their calories from fat than fried french fries.[6] In the average middle school that has a salad bar at least once per week, 7 percent of daily menus included fried french fries and 34 percent included baked french fries. In contrast, in the average middle school without a salad bar, fried french fries were served in 16 percent of the daily menus whereas baked french fries were served in 22 percent of the daily menus.

High schools with daily salad bars are more likely to serve french fries of either type (baked or fried) than high schools without salad bars. High schools with daily salad bars serve french fries in 57 percent of daily menus on average compared with 47 percent in high schools without salad bars.

[6] In the SNDAII data, the average serving of baked french fries has 41 percent of its calories from fat while the average serving of fried french fries has 47 percent of its calories from fat.

Table 6
Types of Fruits and Vegetables Served in NSLP Lunches

Percentage of Daily Menus Including Menu Item in Salad Bar or not in Salad Bar

	Elementary schools			Middle schools			High Schools			All Schools		
	Daily Salad Bar	Salad Bar At Least Once Per Week	No Salad Bar	Daily Salad Bar	Salad Bar At Least Once Per Week	No Salad Bar	Daily Salad Bar	Salad Bar At Least Once Per Week	No Salad Bar	Daily Salad Bar	Salad Bar At Least Once Per Week	No Salad Bar
Types of Vegetables:												
Cooked Vegetables	39	39	42	47	48	50	65**	61**	45	50	49*	44
French Fries, Deep Fried	4	3	3	5*	7*	16	17	17	17	9	9	7
French Fries, Baked	19	17	18	39**	34**	22	39	36	33	30**	27**	21
Potatoes, other	25	25	21	22	23	25	31	29	27	26*	26*	22
Lettuce and/or Tomato#	10	8	7	12	10	14	16	15	16	13	11	9
Green Salad	95**	87**	35	100**	92**	59	100**	92**	61	98**	90**	43
Other Salads	6	9	6	12**	18**	7	36**	30**	8	20**	19**	7
Raw Vegetables	98**	81**	15	92**	84**	20	97**	86**	15	97**	83**	16
Legumes	7	7	7	17**	15**	8	19**	17**	9	13**	12**	7
Other Vegetables (Soups, casseroles)	3	4	4	5	4	7	12	11	9	7	6	5
Types of Fruit:												
Canned Fruit	77**	72**	57	72**	72**	55	75**	74**	53	75**	73**	56
Fresh Fruit	81**	68**	38	78**	70**	54	76**	70**	50	79**	69**	42
Fruit/Vegetable Juice (100 percent)	45**	34**	18	26	22	23	23	22	22	33**	27**	19
Dried Fruit	15**	12**	1	13**	10**	2	7*	6*	1	12**	9**	1
Frozen Fruit	10	9	8	9	8	6	7	6	4	9	8	7
Combination of Fresh, Frozen, Canned and/or Dried	1	1	1	2	1	1	1	1	1	1	1	1
Sample Size (Number of Schools):												
Unweighted	*38*	*54*	*331*	*61*	*86*	*243*	*86*	*117*	*211*	*185*	*257*	*785*
Weighted	*4,719*	*6,424*	*39,555*	*2,452*	*3,223*	*9,119*	*4,083*	*5,268*	*7,589*	*1,1254*	*14,914*	*56,262*

Note: Typically, the lettuce and/or tomato category includes lettuce and/or tomato that are offered as toppings to sandwiches. A salad bar was counted as having lettuce and/or tomato if it offered tomato but not lettuce. A salad bar was categorized as green salad if it offered lettuce. Chef's salads were categorized as green salads. The raw vegetables category excludes lettuce and tomato.

*Difference in those schools with and without salad bars is statistically significant at the .05 level

**Difference in those schools with and without salad bars is statistically significant at the .01 level

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Section IV: What Are The Characteristics of Schools Offering Salad Bars?

This section describes selected characteristics of school food service programs in public NSLP schools that offered salad bars and other fruit/vegetable-based self-serve bars.

Section IV.A. Free and Reduced Price Eligibility and Participation in the National School Lunch Program

Participation in the NSLP is open to all students in participating schools. Students from low-income families are eligible to receive meals free of charge or at a reduced price (The maximum charge for a reduced price lunch is $0.40 per day). In SY 1998-99, the year data were collected in SNDA II, one-third of students enrolled in public schools were approved for free meal benefits. Another eight percent were approved for reduced price meals. The percentage of students approved for free and reduced price meal benefits is higher in elementary schools (45 percent) than in middle schools (38 percent) or high schools (30 percent). (See SNDA-II report page15.)

Salad bars were more commonly found in the more affluent public NSLP schools (Table 7). Schools offering salad bars at least once a week had a significantly lower percentage of students approved for free and reduced price meals than those schools not offering salad bars. This was evident in elementary, middle and high schools. It is also true in high schools offering salad bars on a daily basis.

Table 7
Percentage of Student Enrollment Approved For Free/Reduced Price NSLP Meals, 1998-99

	Schools Offering Daily Salad Bars	Schools Offering Salad Bars at Least Once per Week	Schools without Salad Bars
Elementary Schools	38	38*	46
Middle Schools	34	32*	40
High Schools	25**	25**	33
All Schools	32*	32**	43

*Difference in those schools with and without salad bars is statistically significant at the .05 level
**Difference in those schools with and without salad bars is statistically significant at the .01 level
Source: Weighted tabulations of menu data from SNDA-II for one week between September 1998 and May 1999.

On an average day during the target week for the study, approximately 60 percent of all students in public NSLP schools received an NSLP lunch. Participation varied by type of school, with participation being highest in elementary schools (67 percent) and lowest in high schools (39 percent). Participation also varied by meal benefits. Students approved to receive free lunches participated at a higher rate (80 percent overall) than either students approved to receive reduced price lunches (69 percent) or students who paid full price (48 percent). (See SNDA-II report, page15)

The participation rate for students paying full price in middle or high schools was significantly higher for schools offering a salad bar either daily or at least once per week than for schools without salad bars (Table 8). The participation rate was unrelated to availability of salad bars in elementary schools. The positive association between the presence of salad bar and school lunch participation does not necessarily imply that salad bars improve school lunch participation. Other factors could account for the relationship.[7]

Table 8
School Lunch Participation Rates by NSLP Certification Status and Salad Bar Availability, SY 1998-99

	Free and Reduced			Paid (Full Price)		
	Daily Salad Bar	Salad Bar at Least Once Per Week	No Salad Bar	Daily Salad Bar	Salad Bar at Least Once Per Week	No Salad Bar
Elementary Schools	85	84	83	59	61	56
Middle Schools	79**	78**	71	48*	48*	37
High Schools	62	64*	58	58**	58**	47
All Schools	75	75	78	48	49	49

*Difference in those schools with and without salad bars is statistically significant at the .05 level
**Difference in those schools with and without salad bars is statistically significant at the .01 level
Source: Weighted tabulations of menu data from SNDA-II for one week between September 1998 and May 1999.

Section IV.B: Urbanicity and School Size

Among public NSLP middle schools and high schools, urban schools are less likely to have salad bars than are suburban or rural schools (Figure 2 and Appendix Table A7). Among high schools, those in the 500-999 student range are most likely to have salad bars. (Table 9)

High school size and urbanicity are closely related. For example, urban areas are more likely to have high schools with 2000 or more students than rural or suburban areas. In order to disentangle the relationship between urbanicity and school size, we conducted a regression analysis of the determinants of whether a schools had a salad bar. In a multivariate context, both urbanicity and school size are important determinants of salad bar availability in high schools (See Appendix Tables A5 and A6.)

[7]For example, it is possible that schools that already had high participation rates have been the first to adopt salad bars.

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Figure 2. Salad Bars are Less Available at *Urban* Middle and High Schools

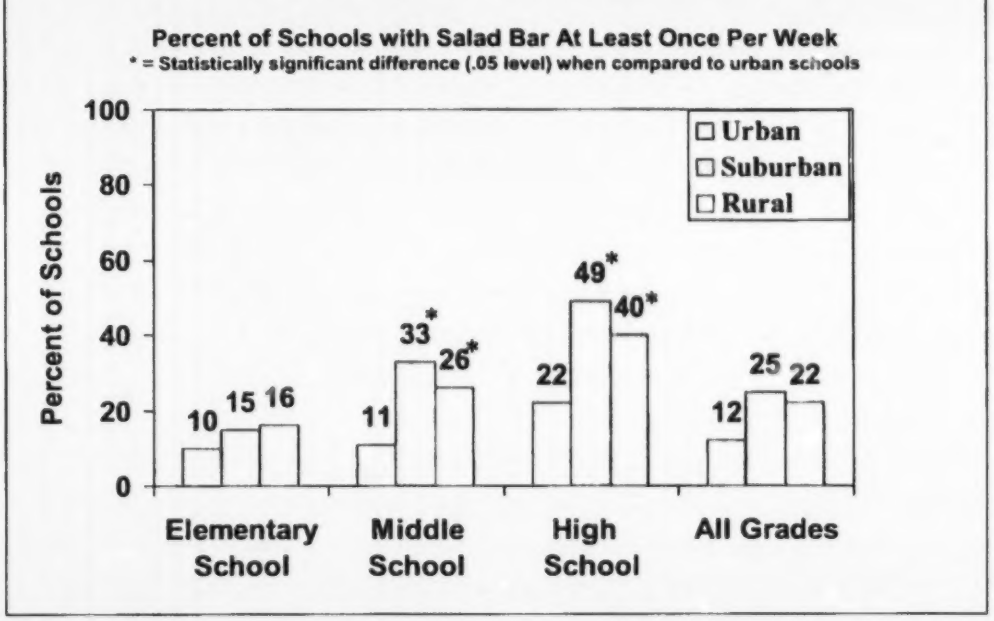

Table 9
Availability of Salad Bars in Public NSLP Schools by School Size, SY 1998-99

	High Schools				All Schools			
	<500 students	500-999 Students	1000-1999 Students	2000+ Students	<500 students	500-999 Students	1000-1999 Students	2000+ Students
Daily Salad Bar	18*	48	24*	33*	12	20	17	27
Salad Bar at Least Once Per Week	29*	63	32*	33*	18	25	24	28
Sample Size (Number of Schools)								
Unweighted	*72*	*81*	*112*	*52*	*392*	*384*	*177*	*55*
Weighted	*2587*	*4053*	*4145*	*1756*	*31,441*	*28,622*	*6,786*	*2,118*

*Statistically significant difference (.05 level) when compared to schools with 500-999 students
**Statistically significant difference (.01 level) when compared to schools with 500-999 students
Note: Elementary schools and middle schools are not shown separately because sample sizes are too small to produce reliable estimates for some size categories.
Source: Weighted tabulations of menu data from SNDA-II for one week between September 1998 and May 1999.

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Section IV.C: Food and Nutrient Characteristics:

One of the major findings of the SNDA-II study is that the average school lunch did not meet *Dietary Guidelines for Americans* recommendations for percent of calories from fat and saturated fat. Lunches served to students in SY 1998-99 provided more than one-third of the Recommended Dietary Allowances (RDAs) for targeted nutrients and calories except in secondary schools, where calories fell short of meeting the recommended level. (See SNDA-II report, page 76) In the context of this report, this begs the question "**Are Meals Served at Schools with Salad Bars More Nutritious?**" SNDA-II did not collect data on the specific quantities of different foods selected by students from self-serve salad bars. In the SNDA-II report assumptions were made about the foods selected to enable nutritional analysis, a reasonable approach given that salad bars were available at only about 20 percent of the schools. However, without data on the actual quantities selected from the salad bar, a direct comparison of the nutrient content of meals served at schools with and without salad bars cannot be considered reliable. As an *exploratory* consideration, Appendix B examines food and nutrients using the SNDA-II assumptions on selections from salad bars.

Section V: Limitations

This report is limited by the SNDA-II data, which provides information on foods offered and average meals served, but not on actual intake or plate waste. It is also limited to public schools, as the SNDA-II sample did not include private schools. The lack of data on selection of specific foods from self-serve salad bars restricts analysis intended to compare the food and nutrient content of average meals at schools with salad bars relative to other schools. A more detailed discussion of limitations is provided in Appendix C.

Section VI: Discussion and Conclusions

Using data from SY 1998-99, our analysis finds that salad bars are available at least once per week in 21 percent of public schools. The availability of salad bars is low in schools with high percentages of children approved for free and reduced price meals and schools with low rates of school lunch participation. Salad bars are less likely to be available in urban schools than in suburban schools and rural schools. Salad bars are most common in high schools and least common in elementary schools.

Access to salad bars is associated with access to a greater variety of fruit and vegetable offerings. Because of data limitations, we cannot determine whether access to salad bars is associated with increased *consumption* (intake) of fruits and vegetables.

One barrier to expanding access to salad bars could be the cost. Anecdotal reports indicate that many school systems believe that self-service salad bars greatly increase meal costs due to the need for substantial upfront equipment investment as well as ongoing costs related to increased food and labor costs. Studies are needed to validate or refute this common belief. Detailed information from one elementary school that recently implemented a salad bar indicated that the start-up costs were approximately $7000.

Other issues schools must take into account when considering the adding a salad bar include additional labor costs for preparation of items (i.e. washing, cleaning, chopping produce, etc), replenishing items during service periods and cleaning the unit, monitoring and documenting temperatures for food safety purposes, monitoring student use of salad bar for proper use (related to food safety, serving portions for a reimbursable meal and plate waste) and additional time for students serving themselves.

The SNDA-II original report and an exploratory analysis in this report indicate that while at all grade levels, schools with and without salad bars are generally doing well in providing RDA nutrients, they do not on average meet the NSLP nutrition standards for fat, saturated fat and sodium. Continued improvement will be needed to achieve meals offered, served and consumed that are fully consistent with the principles of the *Dietary Guidelines for Americans*. An additional study would be needed to determine whether the availability of school lunch salad bars would actually increase school meal and total daily consumption of fruits and vegetables by students.

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APPENDIX A

SUPPLEMENTARY TABLES

Table A1 Nutrition Standards Used in Evaluating School Meals	
NUTRIENT	**STANDARD**
Nutrition Standards Defined in NSLP and SBP Regulations	
Nutrients with established Recommended Dietary Allowances (RDAs)	
Calories, protein, vitamin A, vitamin C, calcium, and iron	**Breakfast:** One-fourth of the RDA **Lunch:** One-third of the RDA
Nutrients included in the *Dietary Guidelines for Americans*:	
	Breakfast and Lunch:
Total fat	≤30 percent of total calories
Saturated fat	<10 percent of total calories
National Research Council *Diet and Health* –Based Recommendations	
Carbohydrate	**Breakfast and Lunch:** >55 percent of total calories
Cholesterol	**Breakfast:** ≤75 mg
	Lunch: ≤100 mg
Sodium	**Breakfast:** ≤600 mg
	Lunch: ≤800 mg

Note: Recommendations for cholesterol and sodium are equivalent to one-third (lunch) and one-fourth (breakfast) of the recommended maximum daily intake.

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Table A2
On a Typical Day, Percentage of Students in Public NSLP Schools With Access To Salad Bar

	Elementary School Students	Middle School Students	High Schools Students	All Grade Levels
Students of All School Meal Eligibility Categories	10	20	34	20
Free and Reduced Price Students	8	16	25	15
Paid Students	12	21	37	23

Source: Weighted tabulations of data from SNDA-II for one week between September 1998 and May 1999.

Table A3 Percent of Days in Which a Particular Vegetable Was Offered in an Average Public NSLP School with Salad Bar				
	Elementary Schools	Middle Schools	High Schools	All Schools
Any Vegetable	98	100	97	98
Lettuce	87+	97	94	92
Tomato	62*	72	77	70
Any Raw Vegetable (excluding lettuce and tomato):	89	92	89	90
Raw Broccoli	54	61	51	55
Raw Cabbage	4	11	5	6
Raw Carrots	71	70	70	70
Raw Cauliflower	23**	34	42	32
Raw Celery	41*	34	25	34
Raw Cucumber	47**++	70	72	61
Raw Green Pepper	23**	41	50	37
Raw Mushrooms	6*	13	15	10
Raw Onion	1	5	12	5
Raw Radishes	10	15	14	13
Raw Spinach	0	0	3	1
Raw Zucchini	0	<0.5	2	1
Sprouts	4	<0.5	3	3
Any Cooked Vegetable	8*	14	20	13
Canned Beets	1**+	9	15	8
Canned Carrots	0	1	1	1
Frozen Peas	7	5	6	6
Any Non-green Salad	8**	13	25	14
Carrot-Raisin Salad	0	2	1	1
Coleslaw or Cabbage Salad	5	2	4	4
Marinated Mushrooms	0	0	3	1
Potato Salad	3	8	14	8
Three Bean Salad	0	4	2	2
Any Legume	0**++	8	11	5
Canned Baked Beans	0	3*	<0.5	1
Canned Chick Peas	0**+	4	10	5
Canned Kidney Beans	0	<0.5	3	1
Other:				
Vegetable Soup	0	<0.5	2	1
Baked Potato	10	4	4	6
Sample Size (Number of Schools):				
Unweighted	*54*	*86*	*117*	*257*
Weighted	*6,423*	*3,222*	*5,267*	*14,914*

*Difference when compared to high schools is statistically significant at the .05 level
**Difference when compared to high schools is statistically significant at the .01 level
+ Difference when compared to middle schools is statistically significant at the .05 level
++Difference when compared to middle schools is statistically significant at the .01 level
Note: Vegetables found in less than one percent of salad bars are not shown as individual vegetables, but are included in the category total. Examples of such vegetables include canned corn and canned okra, which are included in the any canned vegetable total, and red pepper and summer squash, which are included in the any fresh vegetable total.

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Table A4
Percent of Days in Which a Particular Fruit Was Offered in an Average Public NSLP School with Salad Bar

	Elementary Schools	Middle Schools	High Schools	All Schools
Any Type of Fruit	65	49	57	58
Any Type of Fresh Fruit	58*+	39	34	45
Apple	38*	30	23	31
Banana	20	18	9	16
Cantaloupe	0*+	4	6	3
Grapes	13*	16**	4	11
Honeydew	1	1	2	1
Kiwi	5	6	2	4
Oranges	27*	28	18	24
Pear	8	4	<0.5	4
Any Type of Canned Fruit	25**	36	48	35
Canned Applesauce	12	10	15	13
Canned Apricots	4	6	2	4
Canned Fruit Cocktail	12	13	13	13
Canned Maraschino Cherries	3	2	0	2
Canned Peaches	4**+	13	22	12
Canned Pears	2*	14	11	8
Canned Pineapple	17	23	26	22
Any Type of Dried Fruit	11	10	5	9
Dates	7*	4*	<0.5	4
Raisins	4	4	4	4
Any Type of Frozen Fruit	7	4	3	5
Frozen Blueberries	3	2	1	2
Frozen Cherries	4	2	3	3
Sample Size (Number of Schools):				
Unweighted	*54*	*86*	*117*	*257*
Weighted	*6,423*	*3,222*	*5,267*	*14,914*

*Difference when compared to high schools is statistically significant at the .05 level
**Difference when compared to high schools is statistically significant at the .01 level
+ Difference when compared to middle schools is statistically significant at the .05 level
Note: Fruits found in less than one percent of salad bars are not shown as individual fruits, but are included in the category totals. Examples of such fruits are fresh strawberries, fresh pineapple, and fresh grapefruit, which are counted as any type of fresh fruit in the category total.
Note: Only schools serving salad bars at least once per week are included in this table.
Source: Weighted tabulations of menu data from SNDA-II for one week between September 1998 and May 1999.

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Table A5 Linear Probability Model: Dependent Variable=Salad Bar served at least once per week			
Independent variables	**Elementary**	**Middle Schools**	**High Schools**
Intercept	.171**	.403**	.694**
Urban	-.0356	-.217**	-.163*
Rural	.0400	-.0708	-.0851
Suburban (omitted)	Omitted	Omitted	Omitted
0-499 students	.0231	-.0388	-.289*
500-999 students	Omitted	Omitted	Omitted
1000-1999 students	-.0196	-.0923	-.292**
2000+ students	-.208	-.311	-.212*
Free and reduced approval rate	-.00236*	-.00252*	-.00332*
Northeast	.00668	-.0464	-.113
Mid-Atlantic	-.0146	.0124	.128
Southeast	.0496	.0191	.0849
Mid-West	Omitted	Omitted	Omitted
Southwest	.0779	.0234	.00513
Mountain Plains	.114	.267*	.280*
West	.196**	.128	.0575
R-Squared	*.055*	*.110*	*.180*
Sample size	*365*	*301*	*309*

*Statistically significant difference (.05 level)
**Statistically significant difference (.01 level)

Table A6 Linear Probability Model: Dependent Variable=Salad Bar Served Daily			
Independent variables	**Elementary**	**Middle Schools**	**High Schools**
Intercept	.145**	.291**	.430**
Urban	-.0628	-.172**	-.263**
Rural	.0382	-.0400	-.0117
Suburban (omitted)	Omitted	Omitted	Omitted
0-499 students	.00000802	-.0000983	-.276**
500-999 students	Omitted	Omitted	Omitted
1000-1999 students	-.00282	-.0817	-.182**
2000+ students	-.149	-.222	-.00182
Free and reduced approval rate	-.00204*	-.00102	-.00270*
Northeast	-.00958	-.121	-.0821
Mid-Atlantic	-.0373	.0536	.256**
Southeast	.0381	.0232	.202*
Mid-West	Omitted	Omitted	Omitted
Southwest	.105	.0456	.0801
Mountain Plains	.0628	.267	.286**
West	.202**	.122	.163
R-Squared	*.074*	*.099*	*.183*
Sample size	*365*	*301*	*309*

*Statistically significant difference (.05 level)
**Statistically significant difference (.01 level)

Table A7
Availability of Salad Bars in Public NSLP Schools by Urbanicity, SY 1998-99

	Elementary Schools			Middle Schools			High Schools			All Schools		
	Urban	Suburban	Rural	Urban	Suburban	Rural	Urban	Suburban	Rural	Urban	Suburban	Rural
Daily Salad Bars	6	12	12	7	26*	21*	10	40*	32*	6	20	17
Salad Bars at Least Once Per Week	10	15	16	11	33*	26*	22	49*	40*	12	25	22
Sample Size (Number of Schools):												
Unweighted	*97*	*180*	*106*	*92*	*174*	*56*	*75*	*169*	*81*	*264*	*523*	*243*
Weighted	*10999*	*22139*	*12745*	*3343*	*7095*	*1811*	*2258*	*6608*	*3617*	*16899*	*35842*	*18173*

*Statistically significant difference (.05 level) when compared to urban schools.
**Statistically significant difference (.01 level) when compared to urban schools.

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Table A8
Meal Planning Characteristics and Price of Full Price Lunch in Public NSLP Schools with and without Salad Bars, SY 1998-99

	Elementary Schools			Middle Schools			High Schools			All Schools		
	Daily Salad Bar	Salad Bar at Least Once Per Week	No Salad Bar	Daily Salad Bar	Salad Bar at Least Once Per Week	No Salad Bar	Daily Salad Bar	Salad Bar at Least Once Per Week	No Salad Bar	Daily Salad Bar	Salad Bar at Least Once Per Week	No Salad Bar
Who Plans Menu												
District	58	62	64	74	75	66	54	57	62	60	63	64
Off-site kitchen	10	10	8	6	7	5	1	1	2	6	6	6
School	22	20	19	7	8	14	35	32	26	24	22	19
Combination of above	10	8	6	12	9	12	9	10	9	10	9	7
Who Buys Food												
District	41	40	53	64	58	62	41	43	51	46*	45*	54
Off-site kitchen	21*	18*	8	5	7	4	<0.5	2	1	10	10	7
School	12	16	16	19	19	15	28	26	25	19	20	17
Combination of above	27	26	21	11	16	18	31*	29	20	25	25	20
Menu Planning System												
NSMP/ANSM	43*	35	27	29	28	28	32	30	26	36*	32	27
Enhanced food	10**	13**	31	26	24	30	23	26	30	18**	20**	31
Traditional food	37	41	39	39	40	39	43	42	38	40	41	39
Price of Full-Price (Paid) Lunch												
Price Paid	$1.40*	$1.35	$1.29	$1.49	$1.48	$1.43	$1.48	$1.46	$1.42	$1.45 **	$1.42 **	$1.33
Sample Size (Number of Schools)												
Unweighted	*38*	*54*	*330*	*61*	*86*	*242*	*86*	*117*	*211*	*185*	*257*	*783*
Weighted	*4,719*	*6,424*	*39,555*	*2,452*	*3,223*	*9,119*	*4,082*	*5,268*	*7,589*	*11,254*	*14,914*	*56,263*

*Difference in those schools with and without salad bars is statistically significant at the .05 level
**Difference in those schools with and without salad bars is statistically significant at the .01 level
Source: Weighted tabulations of menu data from SNDA-II for one week between September 1998 and May 1999.

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APPENDIX B

EXPLORATORY COMPARISON OF THE FOOD AND NUTRIENT CHARACTERISTICS OF MEALS IN SCHOOLS WITH AND WITHOUT SALAD BARS

This Appendix examines whether lunches offered in schools with salad bars and lunches offered in schools without salad bars differ in the nutritional content. The nutritional analysis includes salad bar and non-salad bar menu items, and all types of foods offered, including fruits and vegetables, meat and meat alternates, milk, and grains. *This analysis is considered exploratory because SNDA-II did not collect data on the specific quantities of different foods selected by students from self-serve salad bars. Therefore, assumptions were made about the foods selected from the salad bar. The results are sensitive to changes in these assumptions, and must be interpreted with caution.*

Food Energy (calories) and RDA Nutrients

Depending on the nutrient and the grade level, there are some differences in the nutrient content of lunches served in schools with and without salad bars (Appendix Table B1). Average calories served are higher for elementary schools with salad bars than those without salad bars. For all grade levels, lunches served in schools with salad bars average higher levels of vitamin A. In elementary schools and middle schools, with daily salad bars, lunches served in schools with salad bars average higher levels of vitamin C.

Next, this Appendix examines the percent of schools meeting the NSLP Nutrition Standards for Lunch (Appendix Table B2). Schools with salad bars are more likely to meet the nutrient standards for some types of nutrients and some grade levels. For all grade levels, schools with salad bars are significantly more likely to meet the RDA-based NSLP nutrient standards for Vitamin C with the exception of elementary schools with salad bars at least once per week. High schools with salad bars are more likely to meet the RDA-based NSLP standard for vitamin A. However, elementary schools with salad bars are less likely to meet the nutrient standard for iron.

Fat and Saturated Fat

In addition, there are some findings that suggest that schools with salad bars are more likely to meet the standards for saturated fat, which state that on average less than 10 percent of calories should come from saturated fat. Specifically, public high schools offering salad bars are more likely to average less than 10 percent of calories from saturated fat than high schools with no salad bars. Twenty-two percent of high schools with daily salad bars and 11 percent of high schools with no salad bars meet the saturated fat recommendation. Elementary schools with daily salad bars or salad bars at least once per week are more likely to meet the recommended levels of saturated fat than elementary schools with no salad bars. But an important caveat should be used in

interpreting the elementary school results. In particular, elementary schools with salad bars are more likely to meet the *Dietary Guidelines* for saturated fat, but they are also more likely to have relatively high levels of saturated fat.[8]

Sodium

In regards to sodium, very few elementary or middle schools met the recommended level and the amount of sodium in an average elementary schools with daily or at least once per week salad bars was even higher than for schools without a salad bar.

[8] In particular, the 75th percentile of saturated fat level for elementary schools with daily salad bars, with salad bars at least once per week, and no salad bars are 13.4 grams, 13.4 grams, and 13.0 grams, respectively.

Table B1
Exploratory Analysis-Mean Calorie and Nutrient Content of Average NSLP Lunches Served, SY 1998-99

	Elementary Schools			Middle Schools			High Schools			All Schools		
	Daily Salad Bar	Salad Bar at Least Once Per Week	No Salad Bar	Daily Salad Bar	Salad Bar at Least Once Per Week	No Salad Bar	Daily Salad Bar	Salad Bar at Least Once Per Week	No Salad Bar	Daily Salad Bar	Salad Bar at Least Once Per Week	No Salad Bar
Nutrients with RDA-based standards												
Calories	721*	721*	689	731	722	708	719	728	741	722*	724**	699
Vitamin A	490	489*	426	456 **	447**	372	419*	422**	362	457*	456**	409
Vitamin C	38**	34**	26	34**	31	27	30	30	29	34**	32**	27
Protein	29	29	29	30	30	29	30	31	31	30	30	29
Iron	4.5	4.5	4.4	4.7	4.6	4.6	4.7	4.7	4.8	4.6*	4.6**	4.5
Calcium	473	473	478	477	478	470	475	482	476	475	456	477
Nutrients with NSLP Standards Based on Dietary Guidelines												
≤30 percent calories from fat	34	34	33	34	34	34	34	34	35	34	34	33
<10 percent calories saturated fat	12.0	11.8	11.9	11.9	12.0	12.1	11.8*	11.9*	12.4	11.9	11.9	12.0
Nutrients Based on NRC Recommendations												
>55 percent calories carbohydrate	52	51	51	51	50	50	50	50	49	51	51	51
Sodium ≤800 mg	1335*	1308*	1244	1410 *	1378	1334	1412	1405	1429	1379* *	1357* *	1283
Cholesterol ≤100 mg	61	63	65	65	66	67	67	68	70	64	65	66
Sample Size: Number of Schools												
Unweighted	*38*	*54*	*331*	*61*	*86*	*243*	*86*	*117*	*211*	*185*	*257*	*785*
Weighted	*4,719*	*6,424*	*39555*	*2,452*	*3,223*	*9,119*	*4,082*	*5,268*	*7,589*	*11254*	*14914*	*5,263*

*Difference in those schools with and without salad bars is statistically significant at the .05 level
**Difference in those schools with and without salad bars is statistically significant at the .01 level
Source: Weighted tabulations of menu data from SNDA-II for one week between September 1998 and May 1999.

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Table B2
Exploratory Analysis: Percentage Public Schools Meeting Nutrition Standards For Lunch by Salad Bar Availability, SY 1998-99

	Elementary Schools			Middle Schools			High Schools			All Schools		
	Daily Salad Bar	Salad Bar at Least Once Per Week	No Salad Bar	Daily Salad Bar	Salad Bar at Least Once Per Week	No Salad Bar	Daily Salad Bar	Salad Bar at Least Once Per Week	No Salad Bar	Daily Salad Bar	Salad Bar at Least Once Per Week	No Salad Bar
Nutrients with RDA-based standards												
Calories	61	66	65	28	23	20	11	13	17	36**	38**	51
Vitamin A	100	100	98	64	68	59	77**	78**	56	84	85	86
Vitamin C	89	89	85	94*	91*	81	81*	81*	69	87	87	82
Protein	100	100	100	100	100	100	100	100	100	100	100	100
Iron	78**	82*	93	58	54	53	62	65	60	68**	70**	82
Calcium	100	100	100	90	88	86	80	84	85	91**	92*	96
Nutrients with NSLP Standards Based on Dietary Guidelines												
≤30 percent calories from fat	23	23	22	14	15	14	15	12	15	18	17	20
<10 percent calories saturated fat	27*	25*	14	19	18	11	22*	18	11	23**	21*	13
Nutrients Based on NRC Recommendations												
>55 percent calories carbohydrate	73	75	83	84	85	86	90	90	84	82	82	84
Sodium ≤800 mg	0	1	1	0	0	0	0	0	<0.5	0	<0.5	1
Cholesterol ≤100 mg	98	99	99	96	97	95	99	99	96	98	99	98
Sample Size: Number of Schools												
Unweighted	*38*	*54*	*331*	*61*	*86*	*243*	*86*	*117*	*211*	*185*	*257*	*785*
Weighted	*4,719*	*6,424*	*39,555*	*2,452*	*3,223*	*9,119*	*4,082*	*5,268*	*7,589*	*11,254*	*14,914*	*56,263*

*Difference in those schools with and without salad bars is statistically significant at the .05 level
**Difference in those schools with and without salad bars is statistically significant at the .01 level
Source: Weighted tabulations of menu data from SNDA-II for one week between September 1998 and May 1999.

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APPENDIX C

METHODOLOGY AND LIMITATIONS

Methodology

SNDA-II data were collected from SFA directors by telephone and from cafeteria managers in sampled schools using a self-administered mail survey. SFA directors provided information on such items as enrollment, number of students approved for free or reduced price, and various menu-planning practices. Cafeteria managers provided information on the number of servings and types of food that were actually served to students during a specified five-day period. Cafeteria managers also provided information on local food service operations such as the availability of a la carte items, types of meal service offered such as salad or other bars, and number of reimbursable meals served each day during the target week, by reimbursement category (free, reduced price or paid). The data collection instruments and a more detailed discussion of the SNDA-II methodology may be found in the original SNDA-II report, Appendix C.

The statistical analyses in this report were conducted by FNS staff using microdata from SNDA-II survey and the statistical software, SAS (SAS Institute, 2002).

Limitations to the Analysis of School Lunch Salad Bars

This report does not explore the number of servings of fruits and vegetables offered to students as part of the National School Lunch Program (NSLP). Program regulations require that all schools participating in the NSLP meet specified nutrition standards for reimbursable meals. Schools generally do so by using a food-based menu planning system that specifies the food items and quantities that must be offered or by using computerized software in planning menus in which milk must be offered along with an entrée and one side dish.[9] More than two-thirds of all schools used a food-based menu planning system in SY 1998-99. The traditional food-based system requires that students be offered a minimum of two servings of fruit and/or vegetables, and an enhanced food-based system requires larger servings of fruits and vegetables and more servings of bread and grain products.

For most menu items, SNDA-II data provide information on *average meals served to* or *selected by* students participating in the NSLP. Schools provided information from production records of the types and quantities of foods available for students to select. For the most part, serving sizes specified on the menus were those required by current program regulations. If cafeteria managers were unable to provide information on portion sizes, default values were applied based on these program requirements.

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[9] Although schools using the computerized menu planning option do not have to offer fruits or vegetables as the side dish, they are required to offer menus that meet RDA standards for vitamins A and C---nutrients found most often in fruits and vegetables.

Cafeteria managers provided information on all foods offered on salad bars and other self-serve bars. For bars served on multiple days, managers were asked to provide information only for the first day the bar was offered. Although portions were available for some items (e.g. the average size of a potato used on a potato bar), portions (quantities) were not specified for most self-serve bars.

Because limited data on portions were collected, the nutritional analysis of salad bars was conducted using a set of assumptions about standard salad bar recipes (Table C-1). For example, if a salad bar included lettuce, tomato, broccoli, and salad dressing, the survey did not collect data on how much lettuce, tomato, broccoli, or salad dressing the average student selected or was served. Rather, the nutritional analyses were conducted assuming that the typical salad selected from that salad bar by a secondary school student included ¼ cup lettuce, 3/8 cup tomato, 3/8 broccoli, and a modest amount of salad dressing.

Table C-1
Coding Rules for Fruits and Vegetables in Salad Bars

Elementary Schools	Secondary Schools
3/8 cup vegetable, half of which is lettuce, plus 3/8 cup fruit If no fruit, ¼ cup vegetable, half of which is lettuce	1 cup vegetable, half of which is lettuce, plus ½ cup fruit If no fruit, 1 ½ cup vegetable, half of which is lettuce

SNDA-II studies what was offered at school lunches, not what students consumed. In addition, the survey collected detailed data on foods served as part of reimbursable meals. Only very limited data on a la carte items is available.

For salad bars, the survey collected detailed information on which individual fruits and vegetables were offered (e.g. peaches), and the number of fruits and vegetables within each category (e.g. canned fruit). These data were not included in the published SNDA-II report, but were obtained via a supplemental data file from Abt Associates. Therefore, we are able to tabulate the percent of salad bars that offered an individual fruit or vegetable.

For non-salad bar fruits and vegetables served as part of the reimbursable meal, the survey collected less detailed information. The nutrient analysis software food coding system only allowed data to be generated as to whether a school offered a fruit or vegetable within a broad category (e.g., canned fruit), not which individual fruits or vegetables were offered (e.g., peaches). Thus, the data allow us to compare whether a certain category of food for (e.g., canned fruit) is more commonly served in schools with salad bars compared to those without salad bars. But we cannot disaggregate those categories to compare the number of fruits or vegetables within a particular category. For example, one can examine whether schools with salad bars are more likely to serve canned fruit than other schools, but one cannot examine whether schools with salad bars serve a larger number of types of canned fruit (e.g., canned peaches and canned pears) than other schools.

When this report analyzes the percent of schools that serve a category of fruits and vegetables, the analysis differs from the published SNDA-II report in an important way. Published tables in the SNDA-II report about the prevalence of categories of fruits and vegetables in schools did not include fruits and vegetables included as part of an entree. For example, tomato sauce topping for pasta would not be included in our analysis of whether tomatoes and/or lettuce are more common in schools with salad bars, even though that tomato sauce would count as at least part of a serving of vegetables in the Food Guide Pyramid.

This report does measure the prevalence of fruits and vegetables in two kinds of entrees: salad bars and chef's salads. The analysis used supplemental data from Abt on the types of fruits and vegetables contained in salad bars. In the interest of treating chef's salads similarly to salad bars, the analysis also assumes that chef's salads contain lettuce and thus are green salads.

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